

long; panicles rather loose, 3 to 5 cm. long, somewhat nodding, the branches slender, glabrous, ascending, rather lax, 1 or 2 at a place, the lower as much as 2 cm. long; spikelets few, longer or shorter than the ultimate pedicels; glumes nearly equal, ovate-lanceolate, acute, 3 to 4 mm. long, glabrous, nerveless, the lower half purple, the upper half hyaline; lemma nearly terete, purple, about 4 mm. long, five-nerved, the intermediate pair of nerves very obscure, hairy between the lateral nerves and the margin, the midnerve densely short-pilose on the lower three-fourths, the callus short, acutish, densely short-pilose, the apex of the lemma gradually narrowed into a stout, scaberulous, curved, untwisted awn, 3 to 4 mm. long, the sides of the lemma extending upward as two short slender teeth at the base of the awn; palea acute, as long as the lemma and not inclosed in it, pilose between the 2 faint adjacent nerves.

Type in the Gray Herbarium of Harvard University, collected on Volcàn Yates, Province of Llanquihue, Chile, alt. 1300 meters, March, 1925, by E. Werdermann (no. 669). The type is the only specimen seen.

BOTANY.—*New grasses from Panama*.<sup>1</sup> AGNES CHASE, Bureau of Plant Industry.

In preparing manuscript on the grasses for the forthcoming Flora of the Panama Canal Zone, it is necessary to use names of new species that have been in manuscript for some time awaiting the completion of revisions of genera. The proposed Flora will not contain descriptions, for which reason the new species from the Canal Zone and immediate vicinity are described here. Two new combinations are also made.

#### *Thrasya Hitchcockii* Chase, sp. nov.

A tufted perennial; culms rather slender, about 70 cm. tall, ascending, simple except for axillary leafless long-peduncled racemes, very flat, sparsely pilose; nodes constricted, the lower short-pubescent; sheaths keeled, pilose, especially at the summit and along the margin, or the uppermost nearly glabrous; ligule firm-membranaceous, about 1 mm. long; blades 15 to 30 cm. long, 5 to 6 mm. wide in the middle (the uppermost reduced or obsolete) tapering to both ends, rather firm, finely pubescent on both surfaces and coarsely pilose, at least at the base and along the margins, as well, the pale midnerve prominent beneath; inflorescence terminal and axillary, the solitary arcuate racemes 10 to 20 cm. long, on long very slender angled pilose peduncles, 2 or 3 peduncles from the uppermost sheath; rachis 2 mm. wide, the narrow membranaceous margins upturned, glabrous, or with a very few long hairs on the edge; spikelets subsessile, spreading about 45°, somewhat crowded, oblong-elliptic, turgid, 3.5 mm. long, 1.8 mm. wide; first glume minute or obsolete; second glume slightly shorter than the sterile lemma, faintly 5-nerved, pilose on the upper third and along the margins; sterile lemma subacute, deeply sulcate, slightly indurate, but thinner down the center and prob-

<sup>1</sup> Received January 25, 1927.

ably splitting at maturity, faintly 5-nerved, the first lateral pair of nerves minutely crested at the apex, pilose along the margin near the summit, the sterile palea as long as its lemma, thin with firm nerves, subtending a rudimentary staminate flower; fruit elliptic, subacute, 3 mm. long, 1.5 mm. wide, the lemma and palea indurate, papillose-roughened, the lemma with a few stiff erect hairs at the apex.

Type in the U. S. National Herbarium no. 1,269,446, collected at the edge of a copse, on a hill, Chorrera, Province of Panama, September 16, 1911, by A. S. Hitchcock (no. 8140).

This species is intermediate between the two groups of *Thrasya*, the extremely specialized *T. petrosa* (Trin.) Chase and its allies and *T. cultrata* (Trin.) Chase and *T. campylostachya* (Hack.) Chase, which resemble *Paspalum pilosum* Lam.

#### *Axonopus centralis* Chase, sp. nov.

Perennial in large bunches; culms erect to stiffly spreading, simple except for the axillary inflorescence, 40 to 90 cm. tall, leafy throughout, compressed, glabrous; nodes glabrous; sheaths keeled, striate, hyaline-margined, usually pubescent on the overlapping edge, at least toward the summit, appressed-pubescent on the sides of the collar; ligule minute, firm, fimbriate; blades folded and keeled at base, flat above, rather lax, 15 to 50 cm. long, 8 to 10 mm. wide, rather strongly nerved, very sparsely pubescent on the upper surface, glabrous beneath, ciliate on the margin toward the base; inflorescence terminal and axillary, finally long-exserted on very slender striate peduncles, the terminal of 3 to 6 racemes, the axillary of 2 or 3, the upper 2 or 3 approximate, the lower remote, the common axis 1 to 6 cm. long; racemes 8 to 15 cm. long, lax, ascending or spreading, the slender rachis glabrous, minutely scaberulous on the angles; spikelets sessile, mostly rather distant, oblong, 3 mm. long, 0.7 mm. wide, the glume and sterile lemma equal, extending one-third their length beyond the fruit, 3 nerved (rarely a faint outer pair in addition) or the midnerve commonly suppressed in the sterile lemma or in both, the lateral nerves of the glume extending into minute scabrous teeth at the apex, the internerves bearing a band of silky pubescence; fruit 2 mm. long, 0.7 mm. wide, oblong-elliptic, pale-stramineous.

This species is related to *Axonopus leptostachys* (Humb. & Bonpl.) Hitchc., from which it differs in its smaller size, fewer and much shorter racemes, and in the minutely dentate apex of the spikelet. This character has not been observed in any other species of the genus.

Type in the U. S. National Herbarium, no. 928831, collected in open grassland between Culebra and Pedro Miguel, Canal Zone, August 28, 1911, by A. S. Hitchcock (no. 7928).

Other specimens of this species are: PANAMA: Between Culebra and Pedro Miguel. *Hitchcock* 7928. Ancon, *Hitchcock* 19891. Taboga Island, *Hitchcock* 8077. NICARAGUA: Jinotepe, *Hitchcock* 8716.

#### *Axonopus ater* Chase, sp. nov.

A densely tufted perennial; culms ascending, simple except for the axillary inflorescence, 40 to 50 cm. tall, leafy at the base, compressed, glabrous; nodes appressed-pubescent; sheaths much shorter than the internodes, keeled, the margins stiffly ciliate; ligule minute, fimbriate; blades folded throughout,

keeled, rather stiff, 4 to 15 cm. long, 4 to 5 mm. wide (opened out), obtuse and scabrous at the apex, sparsely papillose-ciliate on the margin; inflorescence dark purplish brown throughout, terminal and axillary, long-exserted on very slender peduncles, the terminal of 2 to 5, the axillary of 2 racemes, 2 or 3 digitate, the others 5 to 12 mm. below; racemes 4 to 6 cm. long, widely spreading, the center angle of the slender rachis sharply raised; spikelets subsessile, not crowded, oblong-elliptic, 1.7 to 1.8 mm. long, 0.7 mm. wide, the glume and sterile lemma equal, covering the fruit but not exceeding it, strongly 2-nerved, the midnerves suppressed, blotched with blackish purple, glabrous or the glume very obscurely pubescent at base; fruit about the size and shape of the spikelet, pale stramineous, minutely papillose-striate, the lemma with a very minute tuft of hairs at the apex.

Type in the U. S. National Herbarium, no. 1,259,877 collected on moist clay on side of cut along railroad, Gatun, Canal Zone, September 2, 1911 by A. S. Hitchcock (no. 7976).

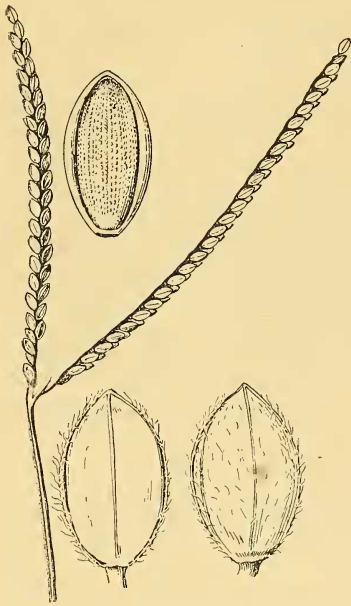


Fig. 1.—*Paspalum subciliatum*, inflorescence, natural size; spikelet and fruit,  $\times 10$ .

This species belongs in the group that includes *Axonopus Purpusii* (Mez) Chase (*Paspalum Purpusii* Mez<sup>2</sup>) differing from the North American forms in the smaller, glabrous blackish spikelets, and from the few South American species of this group having glabrous spikelets in the smaller blackish spikelets with two-nerved glume and sterile lemma.

#### *Paspalum subciliatum* Chase, sp. nov.

A tufted perennial; culms erect and crowded from a short horizontal rhizome, the innovations short and subglobose, resembling bulblets at the base of flowering culms; culms simple, 15 to 45 cm. tall, slender, compressed, striate, glabrous, leafy below; sheaths striate, glabrous or with a few hairs on the margins at the summit, the lower mostly short and crowded, the upper one elongate and bladeless; ligule ciliate, about 0.5 mm. long; blades erect, folded at base and slightly wider than the sheath, flat above, drying more or less involute, with attenuate tip, 10 to 20 cm. long, 2 to 3 mm. wide (or occasional lower ones 5 to 8 cm. long and 5 mm. wide), long-pilose on the upper surface toward the base, otherwise glabrous; inflorescence long-exserted, with a dense tuft of short white hairs at base; racemes 2, conjugate (rarely a third below), narrowly ascending to spreading, 3 to 6.5 cm. long, one usually a little longer and naked at the very base; rachis slender, flexuous, glabrous, purplish; spikelets grayish green, solitary, subsessile, scarcely or not at all imbricate, elliptic, subacute 2.2 to 2.4 mm. long, 1.2 to 1.5 mm. wide; glume and sterile lemma equal, covering the fruit, 3-nerved, the glume minutely pubescent,

<sup>2</sup> Bot. Jahrb. Engler 56: Beibl. 125: 10. 1921.

the hairs longer around the margin, the sterile lemma ciliate toward the summit, otherwise glabrous; fruit pale, very minutely papillose striate.

Type in the U. S. National Herbarium, no. 734821, collected in a savanna, in the vicinity of Balboa, Canal Zone, September 6, 1911, by A. S. Hitchcock (no. 8017). *Pittier* 4500, collected in Sabana de Juan Corso, near Chepo, Province of Panama, also belongs to this species.

This species belongs to the *Notata* group, and somewhat resembles *P. minus* Fourn., from which it differs in the more slender culms, subglobose innovations, narrower blades and especially in the grayish spikelets, pubescent on the glume with a delicate fringe of hairs showing from the flat (sterile-lemma) side.

#### *Paspalum centrale* Chase, sp. nov.

Plants perennial, in small to rather dense and spreading tufts; culms often branching from the lower nodes, sometimes from the middle ones, ascending to spreading, occasionally geniculate and rooting at the lower nodes, 15 to 60 cm. tall (usually 30 to 45 cm.), compressed, ridged, glabrous; nodes glabrous; sheaths rather loose, mostly exceeding the internodes, from sparsely to conspicuously pilose, sometimes glabrous except near the margins, rarely throughout; ligule brown, membranaceous, 2 to 3 mm. long; blades flat, ascending, 5 to 25 cm. long, 3 to 10 mm. wide (commonly 10 to 20 cm. long and 5 to 7 mm. wide, the uppermost reduced), long-acuminate, about as wide at the base as the summit of the sheath, pilose throughout, often sparsely so or rarely subglabrous on the under surface; racemes 2 to 6, distant about  $\frac{1}{4}$  to  $\frac{2}{3}$  their length, or the upper closer, 2 to 7 cm. long, mostly widely spreading, often arcuate, the common axis slender, narrowly winged, rather stiff, sometimes bearing scattered long hairs toward the summits of the internodes, the rachises 1 to 1.3 mm. wide, long-pilose at the base, the hairs sometimes as much as 10 mm. long, hispidulous and sometimes with a few scattered long hairs on the margins and on the midnerve above; spikelets mostly solitary (the secondary one of the pair rudimentary, or a few developed in some racemes) slightly or scarcely imbricate, 2 to 2.3 mm. long, 1.7 to 1.8 mm. wide, elliptic obovate, olivaceous to brownish, glabrous; glume and sterile lemma barely or scarcely covering the fruit, rather fragile, 5-nerved, the outer one of the lateral pair sometimes obscure; fertile lemma and palea shining, very minutely papillose-striate, at first pale turning dark brown.

Type in the U. S. National Herbarium, no. 950876, collected in open flat meadow near the coast, La Union, El Salvador, November 13, 1911, by A. S. Hitchcock (no. 8789).

Along ditches and in moist open ground near the coast Salvador to Panama. The following specimens are from the Canal Zone: PANAMA: Culebra, *Hitchcock* 7985, 8059. Balboa, *Hitchcock* 8004, 8005, 8008, Chivi Chivi, *Killip* 4077. Las Sabanas, *Pittier* 6817.

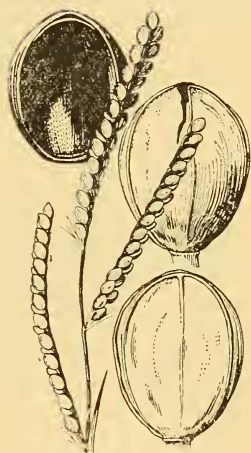


Fig. 2.—*Paspalum centrale*, inflorescence, natural size; spikelet and fruit,  $\times 10$ .

This species is closely related to *Paspalum Boscianum* Flüggé from which it differs in being perennial, not so coarse and less branching in habit, in the pilose foliage, in the relatively slender racemes, with narrower rachises and mostly solitary, rather less turgid spikelets. The panicles of depauperate plants of *Paspalum Boscianum* with solitary spikelets resemble shorter-racemed panicles of *P. centrale*, but such plants are readily distinguished by the difference in foliage. The spikelets of *P. centrale* never assume the rust-brown color characteristically (but not constantly) found in those of *P. Boscianum*.

***Paspalum Standleyi* Chase, sp. nov.**

A slender tufted perennial, forming leafy mats, the culms spreading, some of them rooting at the lower nodes or creeping: culms 20 to 27 cm. long, slender, compressed, simple or branching at the base, glabrous or sparsely pilose below the nodes; nodes bearded with ascending hairs, the upper sparsely so; leaves aggregate at base, the sheaths keeled, the lower rather broad, papillose-pilose, especially along the midnerve and margin and on the

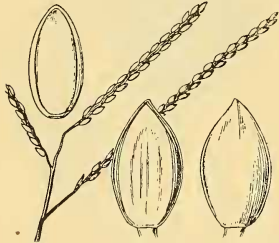


Fig. 3.—*Paspalum Standleyi*, inflorescence, natural size; spikelet and fruit,  $\times 10$ .

collar, the upper glabrous except on the margin and collar; ligule minute; blades flat, spreading, 3 to 6 cm. long, 3 to 6 mm. wide, rounded at base, sparsely papillose-pilose on the lower surface, papillose (or with a few hairs) to glabrous on the upper, the upper blades mostly suppressed; racemes 3 or 4, spreading, 2.2 to 4 cm. long, on a slender glabrous common axis 1 to 1.5 cm. long, the axils glabrous or nearly so, the slender rachis dark purplish, glabrous; spikelets solitary on short flat pedicels, scarcely imbricate, narrowly ovate, somewhat unsymmetrical, subacute, depressed-plano-convex, 1.6 mm. long, 0.9 mm. wide, glabrous, pale or purple-tinged; glume and sterile lemma equal, barely exceeding the fruit, the midnerve suppressed, the marginal nerves strong, the sterile lemma obscurely longitudinally wrinkled in the middle; fruit 1.5 mm. long, 0.7 mm. wide, pale.

Type in the U. S. National Herbarium, no. 1,269,445, collected in marshy thicket, Juan Díaz, Province of Panama, January 11, 1924, by Paul C. Standley, no. 30543.

This species is allied to *Paspalum hyalinum* Nees of Brazil, from which it differs in its spreading habit, softer foliage, the blades much shorter and broader, and slightly larger spikelets, the thin glume and sterile lemma not hyaline and tearing in the middle as in *P. hyalinum*.

***Paspalum acutum* Chase, sp. nov.**

A robust perennial, probably 2 meters or more tall; culms simple, glabrous, leafy to the summit; sheaths overlapping, compressed, striate, pilose on the margin at the summit, otherwise glabrous, the junction with the blade slightly constricted, dark colored; ligule membranaceous, 1.5 to 2 mm. long; blades about as wide as the sheath, slightly rounded and folded at base,

flat above, 30 to 75 cm. long, 14 to 18 mm. wide, long-acuminate, glabrous beneath, sparsely pubescent on the upper surface and with long hairs back of the ligule, the margins sharply serrulate, the uppermost blade greatly reduced; inflorescence scarcely exerted (in specimens seen), the main axis rather slender, 10 to 15 cm. long, plano-convex, scabrous on the margins; racemes 6 to 10, thick, heavy, nodding, 9 to 12 cm. long, with a tuft of long hair at the base, the rachis 1 to 1.5 mm. wide, slightly flexuous, scabrous-serrulate on the margin, otherwise glabrous; spikelets in pairs on minute slender pedicels, imbricate, olive-green, elliptic, 3.5 to 3.9 mm. long, 2 mm. wide, abruptly acute; glume and sterile lemma equal, abruptly pointed beyond the fruit, 5-nerved, the lateral nerves close together near the margins, the glume silky-ciliate on the margin near the summit or nearly glabrous (spikelets varying in a single raceme), the lemma glabrous; fruit elliptic, 3 mm. long, 1.8 mm. wide, pale-stramineous, the lemma and palea minutely papillose-striate under a lens.

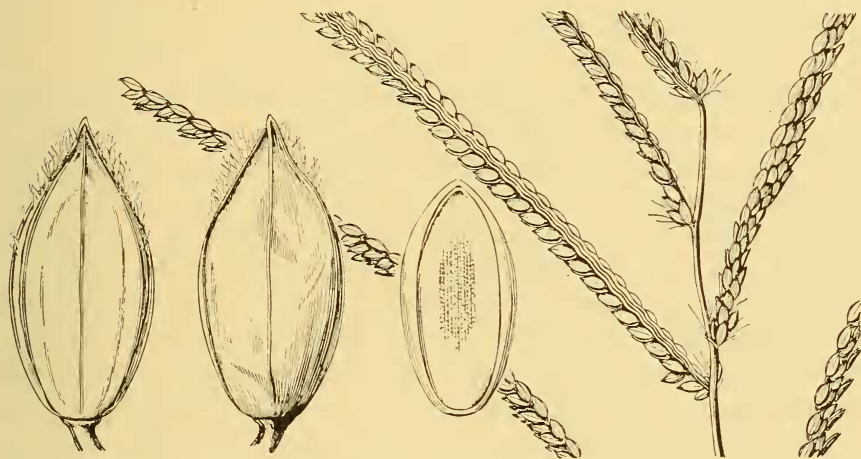


Fig. 4.—*Paspalum acutum*, inflorescence, natural size; spikelet and fruit,  $\times 10$

Type in the U. S. National Herbarium no. 1,037,443, collected in dry fields, Ancon, Canal Zone, September 18, 1917, by E. P. Killip (no. 4003).

The two specimens seen lack the base, but the species belongs to the *Virgata* group and is undoubtedly perennial. It differs from *Paspalum virgatum* L. in the more leafy culms and in the pointed elliptic spikelets, glabrous except the margin of the glume toward the summit, and in the pale fruit.

#### *Sorghum vulgare sudanense* (Piper) Hitchcock.

*Andropogon sorghum sudanensis* Piper, Proc. Biol. Soc. Washington 28: 33. 1915.

*Holcus sorghum sudanensis* Hitchc. Proc. Biol. Soc. Washington 29: 128. 1916.